

NON-PUBLIC?: N  
ACCESSION #: 8902030242  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: DIABLO CANYON UNIT 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000275

TITLE: LOW-LOW STEAM GENERATOR LEVEL REACTOR TRIP FOLLOWING  
A MAIN FEEDWATER  
PUMP TRIP DURING A SURVEILLANCE TEST DUE TO AN UNDERSIZED  
CURRENT  
LIMITING RESISTOR IN A TEST CIRCUIT  
EVENT DATE: 12/13/87 LER #: 87-023-01 REPORT DATE: 01/30/89

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: TERRY L. GREBEL, REGULATORY COMPLIANCE SUPERVISOR

TELEPHONE: (805) 595-4724

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: COMPONENT: JGAS MANUFACTURER: 0149  
REPORTABLE TO NPRDS: NO

SUPPLEMENTAL REPORT EXPECTED: NO EXPECTED SUBMISSION DATE:

ABSTRACT:

On December 13, 1987, at 0325 PST, with the unit in Mode 1 (Power Operation) at 100 percent power, a low-low steam generator level reactor trip occurred following a trip of main feedwater pump (MFWP) 1-1. All automatic safety functions responded as required. The unit was stabilized in Mode 3 (Hot Standby) by 0500 PST. The 4-hour nonemergency report required by 10 CFR 50.72 was made at 0411 PST.

The MFWP trip occurred during continuity tests in the safeguards test panel for the solid state protection system (SSPS) MFWP trip circuit. Investigation determined that the current limiting resistor that allowed the performance of the continuity test was not sufficient to prevent the solenoid from operating when the test circuit was actuated. The original 2.5 K ohm current limiting

resistor has being replaced with a 3.0 K ohm current limiting resistor to ensure that the solenoid does not operate when the test circuit is actuated.

2480S/0067K

END OF ABSTRACT

TEXT PAGE 2 OF 5

## I. Initial Conditions

Unit 1 was in Mode 1 (Power Operation) at 100 percent power.

## II. Description of Event

### A. Event:

At 0325 PST, December 13, 1987, during the performance of Surveillance Test Procedure M-16P2, "Continuity Testing of Slave Relay K601, K620, K636, and K621," main feedwater pump (MFWP) 1-1 tripped when solid state protection system (SSPS)(JG) safeguards test panel slave relay K621B (JG)(RLY) was placed in the test position. All automatic safety functions responded as required.

The unit was stabilized in Mode 3 (Hot Standby) by 0500 PST in accordance with approved plant procedures. The 4-hour nonemergency report required by 10 CFR 50.72 was made at 0411 PST.

### B. Inoperable structures, components, or systems that contributed to the event:

None.

### C. Dates and approximate times for major occurrences:

1. December 13, 1987, 0325 PST: Event date - MFWP and reactor trips.
2. December 13, 1987, 0411 PST: Four-hour nonemergency report to the NRC as required by 10 CFR 50.72.
3. December 13, 1987, 0500 PST: Unit stable in Mode 3.

### D. Other systems or secondary functions affected:

None

E. Method of discovery:

The trip was immediately apparent due to alarms and other indications in the control room.

F. Operator actions:

The appropriate emergency procedures were followed, and the unit was stabilized in Mode 3.

2480S/0067K

TEXT PAGE 3 OF 5

G. Safety system responses:

1. The reactor trip breakers (JC)(BKR) opened.
2. The turbine (TA)(TRB) tripped.
3. The control rod drive mechanisms (AA)(TRB) allowed the control rods to drop into the reactor (AC)(RCT).
4. Auxiliary feedwater (AFW) pumps (BA)(MO)(P) started per design.
5. Main feedwater (SJ) was isolated.

III. Cause of Event

A. Immediate Cause

The water level in steam generator 1-4 reached the low-low level reactor trip setpoint (15 percent), due to MFWP 1-1 tripping off line, thereby causing a reactor trip.

A detailed investigations of this event was conducted. The investigation considered the following:

1. This testing is performed every 92 days and there have been no previous failures on either unit.
2. In an attempt to recreate the failure, the test was repeated 11 times without a recurrence.

3. The "push to test" lamp worked during the first portion of the test; however, it was burned out when examined after the MFWP trip.

4. Associated wiring and components were examined and no indication of a problem was discovered. Only 38 milliamps are required to actuate the MFWP trip solenoid while the circuitry in the test configuration passes 36 milliamps through the MFWP trip solenoid. A momentary short circuit or surge at this low amperage could have caused the trip without leaving any indication.

5. Alarm records were examined to determine if an actual MFWP trip signal had been generated due to low lube oil level or high main feedwater pump discharge header pressure. No alarms were recorded on the alarm typewriter.

2480S/0067K

TEXT PAGE 4 OF 5

B. Root cause:

Investigation determined that the current limiting resistor that allowed the performance of the continuity test was not sufficient to prevent the solenoid from operating when the test circuit was actuated. The original 2.5 K ohm current limiting resistor has been replaced with a 3.0 K ohm current limiting resistor to ensure that the solenoid does not operate when the test circuit is actuated.

#### IV. Analysis of Event

The loss of normal feedwater is a previously analyzed Condition 2 event. The reactor trip on low-low steam generator level and automatic start of the two motor-driven auxiliary feedwater pumps ensured an adequate supply of water in the steam generators to provide for the cooldown of the reactor per design. Thus the health and safety of the public were not affected during or after this event.

#### V. Corrective Actions

An engineering evaluation was performed to investigate the potential problem regarding the amount of current (38 milliamps) required to actuate the MFWP trip solenoid versus the amount of current (36 milliamps) that the test configuration passes through the MFWP trip solenoid. As a result of that evaluation, the original 2.5 K ohm current

limiting resistor was replaced with a 3.0 K ohm current limiting resistor to ensure that the solenoid does not operate when the test circuit is actuated.

## VI. Additional Information

### A. Failed components:

"Push to test" lamp socket

Manufactured by Dialight Corporation (Dilco)

Part number: 5131601-604

### B. Previous LERs on similar events:

1. 2-86-023 - Reactor trip and safety injection due to loss of MFWP 2-2 because of personnel error. The corrective actions taken to prevent recurrence, replacement of the Lovejoy control board and training for technicians, were not applicable to this event.

2480S/0067K

TEXT PAGE 5 OF 5

2. 2-86-021 - Reactor trip due to trip of MFWP 2-1. The corrective action taken to prevent recurrence, flushing the hydraulic control fluid, was not applicable to this event.

3. 2-86-012 - Reactor trip due to trip of MFWP 2-2. The corrective action taken to prevent recurrence, replacement of the thrust bearing wear detector was not applicable to this event.

2480S/0067K

ATTACHMENT 1 TO 8902030242 PAGE 1 OF 1

Pacific Gas and Electric Company

77 Beale Street James D. Shiffer  
San Francisco, CA 94106 Vice President  
415/972-7000 Nuclear Power Generation  
TWX 910-372-6587

PG&E

January 30, 1989

PG&E Letter No. DCL-89-023

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80  
Diablo Canyon Unit 1  
Licensee Event Report 1-87-023-01  
Low-Low Steam Generator Level Reactor Trip Following a Main  
Feedwater Pump Trip During a Surveillance Test due to an  
Undersized Current Limiting Resistor in the Test Circuit

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), PG&E is submitting the enclosed revision to Licensee Event Report 1-87-023-01, concerning the low-low steam generator level reactor trip that occurred following a main feedwater pump trip. This revision is being submitted to report the results of PG&E's evaluation of the cause of the event and the corrective action taken to prevent recurrence. This event has in no way affected the public's health and safety.

Kindly acknowledge receipt of this material on the enclosed copy of this letter and return it in the enclosed addressed envelope.

Sincerely,

J. D. Shiffer

cc: J. B. Martin  
M. M. Mendonca  
P. P. Narbut  
B. Norton  
H. Rood  
B. H. Vogler  
CPUC  
Diablo Distribution  
INPO

Enclosure

DC1-87-OP-N132

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